

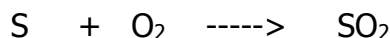
Stoichiometry WS #2 KEY

1. How many liters of carbon dioxide do oxidizing 500 liters of carbon monoxide gas produce?



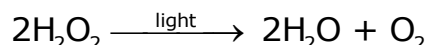
$$500\text{L CO} \times \frac{1\text{mol CO}}{22.4\text{L CO}} \times \frac{2\text{mol CO}_2}{2\text{mol CO}} \times \frac{22.4\text{L CO}_2}{1\text{mol CO}_2} = 500\text{L CO}_2$$

2. How many liters of oxygen are needed to react with sulfur to produce 7000 liters of sulfur dioxide?



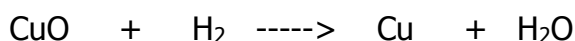
$$7000\text{L SO}_2 \times \frac{1\text{mol SO}_2}{22.4\text{L SO}_2} \times \frac{1\text{mol O}_2}{1\text{mol SO}_2} \times \frac{22.4\text{L O}_2}{1\text{mol O}_2} = 7000\text{L O}_2$$

3. When 70 grams of hydrogen peroxide are decomposed by light, how many liters of oxygen are released?



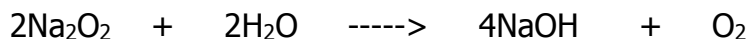
$$70\text{g H}_2\text{O}_2 \times \frac{1\text{mol H}_2\text{O}_2}{34\text{g H}_2\text{O}_2} \times \frac{1\text{mol O}_2}{2\text{mol H}_2\text{O}_2} \times \frac{22.4\text{L O}_2}{1\text{mol O}_2} = 23.1\text{L O}_2$$

4. In the reduction of 100.0 grams of copper II oxide, how many liters of hydrogen are needed?



$$100\text{g CuO} \times \frac{1\text{mol CuO}}{79.5\text{g CuO}} \times \frac{1\text{mol H}_2}{1\text{mol CuO}} \times \frac{22.4\text{L H}_2}{1\text{mol H}_2} = 28.2\text{L H}_2$$

5. How many grams of dihydrogen monoxide must react with sodium peroxide to produce 75.0 grams of sodium hydroxide?



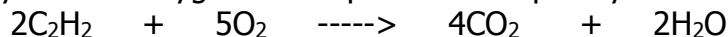
$$75\text{g NaOH} \times \frac{1\text{mol NaOH}}{40\text{g NaOH}} \times \frac{2\text{mol H}_2\text{O}}{4\text{mol NaOH}} \times \frac{18\text{g H}_2\text{O}}{1\text{mol H}_2\text{O}} = 16.9\text{g H}_2\text{O}$$

6. In the Haber process for making ammonia, how many liters of ammonia gas are produced when 4600 liters of nitrogen gas is used?



$$4600\text{L N}_2 \times \frac{1\text{mol N}_2}{22.4\text{L N}_2} \times \frac{2\text{mol NH}_3}{1\text{mol N}_2} \times \frac{22.4\text{L NH}_3}{1\text{mol NH}_3} = 9200\text{L NH}_3$$

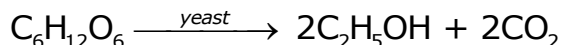
7. How many liters of oxygen are required to completely burn 800 liters of acetylene gas?



$$800\text{L C}_2\text{H}_2 \times \frac{1\text{mol C}_2\text{H}_2}{22.4\text{L C}_2\text{H}_2} \times \frac{5\text{mol O}_2}{2\text{mol C}_2\text{H}_2} \times \frac{22.4\text{L O}_2}{1\text{mol O}_2} = 2000\text{L O}_2$$

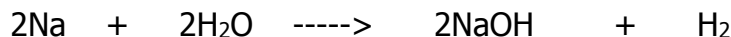
8. In the fermentation process, glucose can be converted to ethanol. How many milliliters of ethanol will be produced if 88000 gm of glucose are fermented?

(HINT: 1. find the number of grams of ethanol 2. Then use 0.8 g/mL to convert grams to mL.)



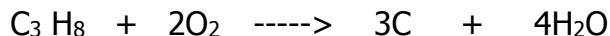
$$88000\text{g C}_6\text{H}_{12}\text{O}_6 \times \frac{1\text{mol C}_6\text{H}_{12}\text{O}_6}{180\text{g C}_6\text{H}_{12}\text{O}_6} \times \frac{2\text{mol C}_2\text{H}_5\text{OH}}{1\text{mol C}_6\text{H}_{12}\text{O}_6} \times \frac{46\text{g C}_2\text{H}_5\text{OH}}{1\text{mol C}_2\text{H}_5\text{OH}} = 44977.8\text{ g C}_2\text{H}_5\text{OH}$$

9. If 25 liters of hydrogen are produced by the reaction of sodium metal and water, how many grams of sodium hydroxide can be produced?



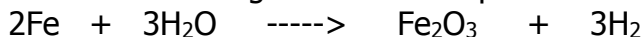
$$25\text{L H}_2 \times \frac{1\text{mol H}_2}{22.4\text{L H}_2} \times \frac{2\text{mol NaOH}}{1\text{mol H}_2} \times \frac{40\text{g NaOH}}{1\text{mol NaOH}} = 89.3\text{g NaOH}$$

10. During the incomplete combustion of 7000 L of propane, how many grams of soot (C) are produced?



$$7000\text{L H}_2 \times \frac{1\text{mol C}_3\text{H}_8}{22.4\text{L C}_3\text{H}_8} \times \frac{3\text{mol C}}{1\text{mol C}_3\text{H}_8} \times \frac{12\text{g C}}{1\text{mol C}} = 11250.0\text{g C}$$

11. Calculate the mass of iron reacting with steam to produce 7500 grams of rust (Fe₂O₃)



$$7500\text{g Fe}_2\text{O}_3 \times \frac{1\text{mol Fe}_2\text{O}_3}{160\text{g Fe}_2\text{O}_3} \times \frac{2\text{mol Fe}}{1\text{mol Fe}_2\text{O}_3} \times \frac{56\text{g Fe}}{1\text{mol Fe}} = 5250\text{g Fe}$$

12. If 500 grams of calcium carbide react with water, what volume of acetylene gas is produced?



$$500\text{g CaC}_2 \times \frac{1\text{mol CaC}_2}{64\text{g CaC}_2} \times \frac{1\text{mol C}_2\text{H}_2}{1\text{mol CaC}_2} \times \frac{22.4\text{L C}_2\text{H}_2}{1\text{mol C}_2\text{H}_2} = 175\text{L C}_2\text{H}_2$$